Patent Claims

1. Data transmission network having
a least one line termination device (2) connected via a data transmission medium (7) to several network termination devices (8), each network termination device (8) comprising
a request message generator (33) for generating a data transmission request message when a data communication device (9) connected to the network termination device (8) is sending data, and
an xDSL transceiver (20) for transmitting an upstream data frame including the generated request message via the data transmission medium (7) to the line termination device (2),
said line termination device (2) comprising
a selection unit (66) for selecting network termination devices (8) which have sent a request message depending on stored status information data of the network termination devices (8),
a grant message generator (68) for generating data transmission grant messages for the selected network termination devices (8), and
an xDSL transceiver (20) for broadcasting downstream data frames including the generated grant messages via the data transmission medium (7) to the network termination devices (8).

2. Data transmission network according to claim 1, wherein the transmission medium is a telephone line.

3. Data transmission network according to claim 1 or 2, wherein a data transmission request message comprises a request message opcode and a number of time slots required for data transmission of the data sent by the data communication device (9).

4. Data transmission network according to one of the preceding claims, wherein a data transmission grant message comprises
a grant message opcode, and
an address of the selected network termination device.

5. Data transmission network according to one of the preceding claims, wherein
the upstream data frames are sent from the network termination devices (8) to the line termination device (2) via the data transmission medium (7) in an upstream frequency band, and
the downstream data frames are sent from the line termination device (2) to the network termination device (8) via the data transmission medium (7) in a downstream frequency band.

6. Data transmission network according to one of the preceding claims, wherein
the downstream frequency band ranges between 1 and 3 MHz and the upstream frequency band ranges between 4 and 8 MHz.

7. Data transmission network according to one of the preceding claims, wherein each line termination device (2) comprises an MII interface (50) for the connection to a switch (4).

8. Data transmission network according to one of the preceding claims, wherein each data frame comprises:
a synchronization data field,
a message data field,
a payload data field, and
an error correction data field.

9. Data transmission network according to one of the preceding claims, wherein each network termination device (8) is connected to a passive signal splitter.

10. Data transmission network according to one of the preceding claims, wherein the passive signal splitter comprises
a low-pass filter (19-i) for filtering a telephone signal, and
a high-pass filter (12-i) for filtering an xDSL data signal.

11. Data transmission network according to one of the preceding claims, wherein the line termination device (2) comprises
storing means (48) for storing the status information data of the different network termination devices (8) connected to the line termination device (2).

12. Data transmission network according to one of the preceding claims, wherein the storing means (48) stores the addresses of the network termination devices (8) and the corresponding numbers of the required time slots received from the network termination devices (8) in request messages.

13. Data transmission network according to one of the preceding claims, wherein the selection unit (66) reads the status information data stored in the storing means (48), selects the network termination devices for data transmission according to a programmed selection algorithm and activates the grant message generator (68) for generating grant messages for the selected network termination devices (8).

14. Data transmission network according to one of the preceding claims, wherein the xDSL transceiver (20) of the line termination device (2) includes an adaptive automatic gain control circuit (32) and an equalizer (38).

15. Data transmission network according to one of the preceding claims, wherein the line termination device (2) comprises

a first storing means (73) for storing the AGC coefficients for the network termination devices (8) connected to the line termination device (2), and
a second storing means (74) for storing equalizer coefficients for the network termination devices (8) connected to the line termination device (2).

16. Data transmission network according to one of the preceding claims, wherein the AGC coefficients of the selected network termination device selected by the selecting unit (66) are loaded into the AGC circuit (32) of the xDSL transceiver (20) of the line termination device (2).

17. Data transmission network according to one of the preceding claims, wherein the equalizer coefficients of the selected network termination device (8) selected by the selecting unit (66) are loaded into the equalizer (38) of the xDSL transceiver (20) of the line termination device (2).

18. Data transmission network according to one of the preceding claims, wherein the network termination device (8) comprises a grant decoder (86) for decoding messages within downstream data frames broadcasted by the line termination device (2).

19. Data transmission network according to one of the preceding claims, wherein the xDSL transceivers (20) are VDSL transceivers.

20. Data transmission network according to one of the preceding claims, wherein the impedances of the network termination devices (8) connected to the data transmission medium (7) are balanced.

21. Data transmission network according to one of the preceding claims, wherein eight network termination devices

are connected via the data transmission medium (7) to the line termination device (8).

22. Data transmission network according to one of the preceding claims, wherein several line termination devices (2) are connected to a switch (4).

23. Data transmission network according to one of the preceding claims, wherein the switch (4) is connected to an IP backbone (5).

24. Method for data transmission comprising the following steps:
(a) generating a data transmission request message by a network termination device (8) when the network termination device receives data from a connected data communication device (9);
(b) transmitting the generated data transmission request message within an upstream data frame via a data transmission medium (7) to a line termination device (2);
(c) selecting the network termination devices (8) depending on stored status information data of the network termination devices;
(d) generating data transmission grant messages for the selected network termination devices (8) by the line termination device (2);
(e) broadcasting downstream data frames containing the generated grant messages via the data transmission medium (7) to the connected network termination devices (8);
(f) transmitting data from the selected network termination device (8) after the grant message has been decoded.

25. Line termination device comprising
a selection unit (66) for selecting a network termination device (8) from a group of network termination devices connected to the line termination device (2) in response to a

request message depending on stored status information data of the network termination devices;
a grant message generator for generating data transmission grant messages for the selected network termination device (8), and
an xDSL transceiver (20) for broadcasting downstream data frames including the generated grant messages via a data transmission medium (7) to the network termination devices (8).

26. Network termination device comprising
a request message generator (83) for generating a data transmission request message when a data communication device (9) connected to the network termination device (8) is sending data, and
an xDSL transceiver (20) for transmitting an upstream data frame including the generated request message via the data transmission medium (7) to a connected line termination device (2).